The Effects of Noise and Aggressive Cues on Preschoolers' Encoding and Interpretation of Social Information

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An Abstract of a Thesis by

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The Problem. These studies examined preschool-age boys' social information processing in situations of arousal. It was hypothesized that, under conditions designed to increase arousal, boys would respond more aggressively than those in neutral conditions.

Procedure. A total of 60 four year old boys participated in each of two studies. In both studies, boys in the experimental condition were exposed to 80 dB of white noise and were shown posters depicting aggressive acts, whereas boys in the control condition experienced normal noise levels and were shown neutral posters. Each boy was asked how a boy puppet should respond in six enacted conflict situations. These responses were rated for level of aggression. Next, each boy participated in two stereotyping tasks assessing his tolerance for children pictured with gender consistent, neutral, or inconsistent toys. Heart rate was measured as a manipulation check and each boy's aggressive behavior was measured in a free-play situation. In experiment one, the hypothetical conflict situations were hostile in their intent as compared to the ambiguous situations enacted in experiment two.

Findings. Analyses of variance indicated that boys in the arousal condition responded with significantly more aggression than did boys in the control condition. No significant differences were found between conditions in the boys' tolerance for

children shown pictured with gender inconsistent toys. There were no significant differences in heart rate between the arousal and control conditions, therefore differences in aggression between groups cannot be directly attributed to physiological arousal caused by the white noise. In the first experiment, there were considerable discrepancies between raters in evaluating aggressive playground behaviors, making it difficult to determine whether there was a correlation between responses in the puppet task and subjects' behavior in a natural setting. The interrater reliability for the playground observations in the second experiment was acceptable, but weakly correlated with aggression ratings in the puppet task.

Conclusion. Heightened aggression in the arousal condition may be due to boys' tendency to attribute hostility to their peers when their social information processing is biased during the encoding and interpretation stages of conflict situations (Dodge & Crick, 1994).

Recommendations. The fact that noise and aggressive cues elicited more aggressive responses in both hostile and ambiguous situations suggests that the procedures applied in this research might provide a safe and ethical way to study young children's physical aggression. Further research is needed to separate the effects of noise and aggressive cues in eliciting aggressive responses and to understand how girls process social information in conditions of arousal.

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Literature Review

Children's social adjustment has been the topic of much current research. Social adjustment has been defined as the degree to which children get along with their peers, engage in adaptive, competent behavior, and inhibit aversive or aggressive behavior (Crick & Dodge, 1994). The degree to which a child is liked or valued by peers is important for understanding social behavior and individual development (Dodge, 1983). Specifically, Parker & Asher (1987) concluded that childhood unpopularity is predictive of adult maladjustment. Self-perceived unpopularity is seen as a marker for emotional difficulties (Cohen, Reinherz, & Frost, 1993). The quality of peer interactions has been investigated to determine what factors contribute to a child's popularity or unpopularity. Developmental psychologists have focused on the role of children's social skills to predict popularity among peers (Adams & Roopnarine, 1994).

Popularity is defined by Masters and Furman (1981) as the degree of general peer acceptance. Popularity of preschoolers is correlated with friendly approach, rate of dispensing social reinforcement, and nurturance given to other peers (Masters & Furman, 1981). Higher levels of cooperative play have also been associated with popularity among peers in preschool-age children (Ladd, Price, & Hart, 1988). Mendelson, Aboud, & Lanthier (1994) found that preschool popularity is predicted by level of social cognition and social competence.

Olson and Brodfeld (1991) found that peer-rejected children can be detected by other children at very early ages. Peer-rejected children are those who are actively disliked by their peers and tend to demonstrate high rates of aggressive and disruptive behavior in classroom settings. It is especially hard for peer-rejected children to change their social status. Children who behave aggressively in peer situations eventually find themselves becoming the victim of other children's aggression, though they still emit a greater number of aggressive acts than they receive from their peers (Olson, 1992).

Peer-rejected children share many common characteristics. A study conducted by Cillessen, Ijzendoorn, Lieshout, & Hartup (1992) found that peer-rejected boys, ages five through seven, display aggressive, impulsive, disruptive, and noncooperative behavior. Peer-rejected children also share low levels of sociability and cognitive abilities (Newcomb, Bukowski, and Pattee, 1993). Perhaps the most prominent characteristics shared by peer-rejected children are their high rates of angry reactive aggression and instrumental aggression (Dodge, Coie, Pettit, & Price, 1990).

Crick and Dodge (1996) examined the difference in hostile attribution biases among 624 third through sixth grade boys and girls who were classified as reactively aggressive, proactively aggressive, or nonaggressive. Reactive aggression is defined as an angry, defensive response to frustration or provocation. Proactive aggression is a deliberate behavior that is controlled by external reinforcements (i.e., it is a means for obtaining a goal). Crick and Dodge (1996) discovered that only reactively aggressive children attributed hostile intent to their peers' actions which in turn led to reactive, or angry aggression. This bias or deficiency in social information processing leads to various behavioral responses including aggression.

In elementary school children, anger has been shown to bias social information processing, which increases the likelihood of reactively aggressive responses (Dodge & Coie, 1987; Dodge, 1991a; Dodge, 1991b). To date, little research has investigated the effects of emotional arousal on social information processing in preschool children.

This thesis examined the effects that noise and aggressive cues have on preschoolers' social information processing in challenging peer situations. To provide the context for this research, three areas of relevant research were examined: the role of emotion in children's social information processing, the effects of biased social information processing on aggression and stereotyping, and research on the effects of arousal on gender stereotyping and responses to hypothetical conflict situations.

Social Information Processing

Crick and Dodge (1994) have developed a social information processing model of children's social adjustment. In this model, children enter into social situations with biologically limited capabilities and memories stored from past experiences. They receive input from environmental cues and their behavioral response to these cues is a function of how the cues are processed.

Steps 1 and 2 of this model involve the encoding and interpretation of environmental cues. It is hypothesized that children selectively attend to particular situational and internal cues, encode, and then interpret them. Interpretation may consist of a number of independent processes: assessing causal attributions, attributing intent, interpreting goal attainment, and evaluating the meaning of social situations for the self and others.

Step 3 proposes that children select goals or desired outcomes for situations or continue with a preexisting goal. According to Crick and Dodge (1994), these goals are focused arousal states which allow the child to work toward producing a particular outcome.

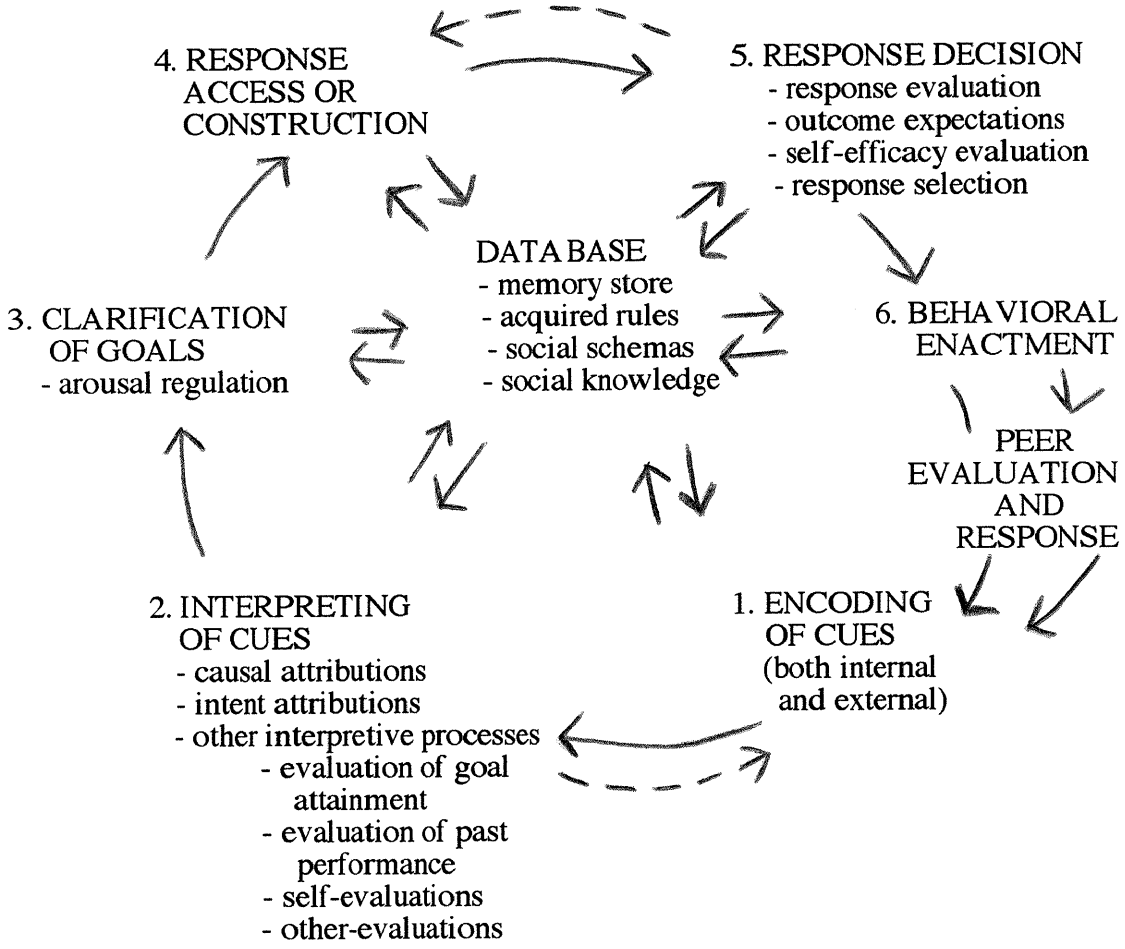
Step 4 hypothesizes that children access their memory data bases for possible behavioral responses to social situations. In case of new stimuli, children construct new behaviors to aid in their responses.

Step 5 suggests that children evaluate all possible accessed behavioral responses and choose the most positively evaluated response.

Step 6 represents the behaviorally enacted response.

Figure 1

Social Information-Processing Model of Children's Social Adjustment
Crick and Dodge (1994)



This reformulated model of social information processing incorporates the parallel nature of processing, positing that individuals are constantly engaging in each of the processing steps. Feedback loops across processing steps and the cyclical nature of this model represent parallel processing of numerous stimuli. Crick and Dodge (1994) propose in this model of social information processing that, although processing of each of these steps occurs simultaneously, the path from a particular stimulus to a behavioral response logically follows a sequence of steps. They suggest that the sequential portion of the proposed model can be useful for understanding the processing of a single stimulus.

The Role of Emotion in Social Information Processing

It is hypothesized in the Crick and Dodge (1994) social information processing model that emotion interacts with cognition in a variety of important ways at each processing step. Emotional arousal (e.g., an increase in heart rate) during the encoding procedure may serve as an internal cue that must be encoded. Emotions may also influence a child's interpretation of social cues. For example, anger or anxiety present when a child is introduced to a new peer may lead to an immediate dislike of that peer. It has been found that affect occurring during encoding of problematic peer situations may influence the choice of behavioral strategies and enacted behavior (Denham, Bouril, & Belouad, 1991).

Researchers have investigated the effects of overall general affect on young children's abilities to respond appropriately in challenging peer situations. Denham, et al., (1991) found that preschool children who chose prosocial responses to hypothetical conflict situations often expressed sadness when asked to reflect on their feelings. The authors speculated that this reported sadness may represent concern or distress associated with the problematic peer situation depicted. Conversely, children who chose aggressive or hostile responses to the same hypothetical conflict situations,

reported feeling angry following the problematic peer situations. Denham, et al. (1991) suggested that children with positive general affect may be more capable of accessing and utilizing appropriate social responses. Their success was attributed to an understanding of other children's emotions and accurately reflecting on the emotions inherent in challenging peer situations (Denham, et al., 1991).

Anger has also been found to play an integral role in processing social information (Lemerise & Dodge, 1993). It has been shown to bias social information processing and, in turn, may occur as a function of biased processing. For preschool-age children, the most common anger-eliciting situations involve the acquisition of material objects (Hartup, 1983; Parke & Slaby, 1983). Instrumental goals are the most common function of anger for children at this age-level while person-directed and hostile aggression increase after age four. Although anger may have instrumental functions in some cases, it also serves as a facilitator for aggressive behavior (Lemerise & Dodge, 1991).

Aggressive Behavior and Biased Social Information Processing

Aggression can be defined as the exhibition of deliberate actions directed towards other people or objects (Lochman & Lenhart, 1993). Aggressive behavior in childhood has been correlated with later social maladjustment problems such as low academic achievement, early school dropout, and juvenile delinquency (Parker & Asher, 1987). Brook and Newcomb (1995) discovered, through extensive interview follow-up techniques examining the effects of early childhood aggression on later life adjustment, that aggression in childhood is correlated with poor academic progress, problems in the workplace, and higher rates of drug use in adolescence.

Aggressive children are easily identified by other children and are more likely to be perceived as responsible for their aggressive acts than are nonaggressive children committing the same acts. Children are also less likely to feel sympathy for an

aggressive child, more likely to feel an aggressive child is deserving of anger from others, and less willing to accept an aggressive child socially (Graham & Hoehn, 1995). Ladd, Price, & Hart (1988) found that children's aggressive playground behavior at the beginning of the school year is highly predictive of their peer-rejected status at the end of the year.

Studies in the social information processing of aggressive children have demonstrated that aggressive children perceive, interpret, and make decisions about social information in ways that increase the likelihood of their engaging in aggressive acts (Dodge & Crick, 1990). Some researchers have assessed children's inappropriate aggressive behavior as a developmental lag in the acquisition of social role-taking skills (Dodge & Frame, 1982). Dodge and Crick (1990) would explain this behavior as biased or deficient processing of social information.

Much research has been devoted to the biased social information processing of aggressive boys (Dodge, 1980; Dodge & Newman, 1981; Dodge & Frame, 1982; Dodge & Somberg, 1987). It has been discovered that socially rejected children who exhibit aggressive behavior display biases in their social information processing by excessively attributing hostile intentions to peers in ambiguous conflict situations (Dodge & Somberg, 1987). Although this area of research has primarily focused on school-age boys, Fondacaro and Heller (1989) have found that this hostile attributional bias is also apparent in aggressive adolescent boys' social information processing styles. Dodge (1980) exposed groups of aggressive and nonaggressive boys to hypothetical situations in which the outcomes were negative but the intent of the provocateur was ambiguous. It was found that boys classified as aggressive were both more likely to respond aggressively and more likely to attribute a causal negative intent to the provocateur in the situation, than were nonaggressive boys. Dodge and Frame (1982) asserted that the difference between aggressive and nonaggressive children's

likelihood of defining hostile intent reflects a bias in social information processing in aggressive children that is not present in nonaggressive children.

Dodge and Crick (1990) examined these differences more closely and related them to specific steps of social information processing. They assert that in the encoding process, a failure to encode relevant cues will lead to deviant social responses. The interpretation step in the social information processing model requires the individual to accurately interpret a peer's cues. Aggressive children are relatively deficient in several cue interpretation skills. They have been found to make decisions about intent impulsively, usually attributing hostile intent in ambiguous situations, and using available information in biased ways (Dodge & Crick, 1990).

Most of the research completed to date has focused on the effects of biased information processing on the immediate social situation. Relatively little is known about how it affects broader social judgments, such as stereotyping.

Stereotyping and Biased Social Information Processing

Schemata are memory structures that organize information to facilitate comprehension and aid in interpretation by allowing the individual to sort information quickly as either schema "consistent" or "inconsistent" to a particular category, such as males or females (Crick & Dodge, 1994). Researchers on gender stereotyping have found it useful to consider stereotypes as information processing structures with the idea that sex-stereotypes are "schemas". Schemas, when applied in information processing models, function to organize and structure experiences by telling the individual what cues to look for in the environment and how to interpret those cues (Martin & Halverson, 1983).

Children learn about social categories of gender at a very early age and consequently form stereotypes about what females and males look like, what activities they prefer, and how they act (Martin, 1989). Gender schema theories attempt to

describe how children acquire gender stereotypes. These theories suggest that children are generally ready to encode and organize information according to what is appropriate or typical for males and females in a particular society (Levy & Carter, 1989). By age four, children are very knowledgeable about what is "appropriate" behavior for a boy or a girl (Fagot & Leinbach, 1989).

McAninch, Manolis, Milich, and Harris (1993) examined gender stereotyping in conjunction with children's social information processing techniques and found that children are more likely to make categorical judgments about a target child congruent with schema easily accessed from memory than they were to make attribute-based judgments, or judgments based on specific trait information. This willingness to categorize target children according to known stereotypes, or schemas, and to dismiss trait information, is evident in tasks requiring children to rate how much they like target children.

McAninch, et al. (1993) found that when children were asked to rate how friendly they thought a target individual was and were then asked to watch a video disclosing various trait information about the target individual, subjects were likely to change their friendly rating and take into account specific trait information. The authors' interpretation was that children had specific cues to encode and use to make value judgments about an individual. When children were asked to rate how much they liked a target individual and then watch a video disclosing various trait information, however, subjects were not willing to change their prior ratings. This finding demonstrates children's unwillingness to reevaluate their feelings toward the target and their tendency to base their judgments solely on stereotypes in liking tasks. This phenomena is demonstrated in the difficulty peer-rejected children have in gaining acceptance despite their improved behavior.

Martin and Halverson (1983) also investigated gender stereotyping in the context of an information processing model. They found that children are not likely to

distort memories of pictured target individuals if the trait information they learn about these people is consistent with gender schema available in their memory base. If, however, the learned information is inconsistent with known schemas, children will be more likely to distort information in memory by changing the sex of the actor in sex-inconsistent pictures to fit learned stereotypes.

Gender stereotyping is readily available to children of all backgrounds at very young ages. As reviewed below, research suggests that reliance on gender stereotyped information is especially enhanced under conditions of arousal.

Arousal and Gender Stereotyping

Costanzo and Dix (1983) hypothesized that in some circumstances, qualities of situational cues lead children to engage in "preemptive" or script-based processing. This type of processing does not follow the rules of formal information processing, but instead is "processing without thinking". Preemptive processing is rapid, automatic, irrational, and generally occurs in social situations that are emotionally arousing and highly important to the individual (Crick & Dodge, 1994). Arousal has been found to encourage reliance on simpler, and perhaps more dominant response strategies. Arousal creates biological interference limiting processing capacity and efficiency (Bodenhausen, 1993).

Paulhus, Martin, & Murphy (1992) examined the effects of arousal on sex stereotyping among adult subjects during recall of two inference situations. Subjects were given either stereotype neutral information or stereotype inconsistent information about four target individuals and were asked to rate the targets on how likely they were to possess gender-related traits. Ratings of the target individuals were completed under two conditions of arousal manipulated by amounts of white noise (50 dB and 90 dB). Each subject's level of arousal was measured subjectively. Results showed that there

was a significant effect of arousal which increased schematicity and decreased cognitive complexity for gender-based inferences.

Arousal theories of gender stereotyping suggest that gender-based inferences will be enhanced by arousal especially if memory representation is stereotyped during encoding (Paulhus, Martin, & Murphy, 1992). Crick and Dodge (1994) hypothesize that arousal in certain situations will lead to more automatic, preemptive processing which in turn, will lead children to rely on automatically available stereotyped schema in forming responses to social situations. Aggressive children are more likely than nonaggressive children to base their interpretations on schemata when under conditions of threats to the self (Dodge & Somberg, 1987). Just as arousal enhances children's stereotyped responding in challenging social situations, it has also been found to affect the rate of aggressive responding among children.

Arousal and Hostile Attributional Bias

Dodge and Somberg (1987) found that high affective arousal leads aggressive children to process social information using what is known in the literature as "hot cognition". Hot cognition is the opposite of the cool, rational processing of information under relaxed conditions. Negative-affect-inducing stimuli have been found to disrupt children's attempts to delay gratification, their ability to resist temptation, and their problem-solving performance. Dodge and Somberg (1987) found that under relaxed environmental conditions, aggressive and nonaggressive children attribute intent to provocateurs of ambiguous negative outcome situations very similarly. When subjects were asked to judge the intent of a provocateur under conditions of "threat to the self" however, aggressive children attributed hostile intent at a much higher rate than nonaggressive children. It has been found that aggressive boys display this hostile attributional bias when involved in provocations by peers.

This Dodge and Somberg (1987) study demonstrates that aggressive boys are less skilled at accurately interpreting the intentions of peers and are more likely to display biased social information processing in conditions of high arousal. The process of social cognition is less coherent among aggressive boys. Dodge & Somberg (1987) suggest that the use of multiple cognitive processes may be implicated in the behavior of aggressive children making their behavioral responses significantly less predictable and perhaps more arbitrary than those of nonaggressive children. The results of this study suggest that those children who are least skilled at cue interpretation, experience pronounced deficits in performance under threatening conditions.

Another study conducted by Craven and Lochman (1997) examined the effects of physiological and emotional arousal and attributional processes on boys' aggressive responses in hypothetical situations. Subjects in this study were fifty-one fifth and sixth grade ADHD boys assigned to one of three experimental conditions depending on their level of aggression. A situation similar to that used in Dodge's (1980) research was enacted, in which a supposed hostile peer is either "in a bad mood", does not wish to participate in the experimental task with the subject, or wants to pick a fight. Subjects in each of the three conditions were compared on level of physiological arousal measured by periodic heart rate checks, level of emotional arousal measured through self-report, and the believed intent of the provocateurs in stories depicting ambiguous situations. It was determined that boys in the high aggression group attributed hostile intent to the provocateurs in the ambiguous situations more often than did subjects in the low aggression group. Differences in attributional style between groups were directly related to physiological and emotional arousal, with higher physiological arousal correlated with higher rates of hostile attributions.

One theory investigating the deficiency in information processing among aggressive children suggests that these children may have the capability to respond prosocially in challenging peer situations, but the responses that are most automatic and

readily occurring are problematic. Rabiner, Lenhart, and Lochman (1990) conducted a study investigating the differences between children's automatic and reflective social problem solving strategies. In this study, children were read stories depicting characters involved in conflict situations important to children's social interactions. In the first phase of this task, the children were asked to respond with a solution to the conflict as quickly as possible. When asked to respond immediately to hypothetical social problems, both aggressive and nonaggressive rejected boys responded with conflict-escalating strategies. These instructions were given in hopes of eliciting what Rubin and Krasnor (1986) refer to as automatic, or scripted processing. They argued that these responses are probably more representative of how children respond in actual social situations where "time-pressures, affect, and self-interest could mediate against higher levels of practical knowledge" (Rubin & Krasnor, 1986). When subjects were asked to wait twenty seconds before responding to similar situations nonaggressive-rejected children decreased their conflict-escalating responses (Rabiner, Lenhart, & Lochman, 1990). These delayed responses were believed to be the result of a more conscious, or deliberate style of processing (Rubin and Krasnor, 1986).

The differences between verbal and enactive responses to hypothetical conflict situations have also been examined (Mize & Ladd, 1988). When examining both aggressive and nonaggressive preschoolers' responses to problematic peer situations, a distinct difference emerged when looking at enactive responses. Aggressive children were more likely to display aggressive or hostile responses when they were actively participating in the situation than when they were asked to verbalize their response. Although this phenomena is not fully understood, one possibility may be that these children have a limited repertoire of appropriate behavioral responses and therefore need to learn more appropriate ways of responding. Another possibility which is hypothesized by the authors is that these children may have competent problem solving abilities, but may appear deficient in their capabilities due to the availability of

problematic responses as opposed to more appropriate behavioral responses (Rabiner, Lenhart, & Lochman, 1990). These children may consider what is socially desirable before responding verbally, but aggressive children lack inhibition control when enactive responses are required (Mize & Ladd, 1988).

Responses as a Result of Perceived Intent of Peers

A widely studied component of children's social information processing is determining the intent of their peers in various social situations. This task involves interpreting social cues and using these cues to determine whether their peers intent was either hostile or benign (Crick, 1995). Previous research findings indicate that overtly aggressive children attribute hostile intent to others in ambiguous situations more often than do nonaggressive children (Dodge, 1980; Dodge & Frame, 1982; Quiggle, Garber, Panak, & Dodge, 1992). According to Crick and Dodge (1994), attributing a hostile intent to other's behaviors is more likely to lead to an aggressive response by the child. Aggression, according to Crick (1995), acts as a defense against a hostile peer.

Dodge and Coie (1987) examined the difference between hostile attributional biases in reactively aggressive and proactively aggressive boys in peer group settings. They hypothesized that boys who chronically respond in a reactively aggressive way will be more likely to view the provocateur's intent as hostile and therefore respond more aggressively than would boys classified as proactively aggressive. Subjects were presented with a number of videotaped provocations in which the intent of the provocateur was either hostile, accidental, or prosocial and were then asked to generate a behavioral response. Dodge and Coie (1987) found that boys who respond in reactively aggressive ways are more likely to view the intent of a provocateur as hostile, no matter what the original intent was meant to be. Reactively aggressive boys are also more likely to respond aggressively to these situations.

Similarly, Waldman conducted a study with 316 boys, ages 8-12, addressing whether aggressive boys show hostile attributional biases or overall general deficits in social perception. According to Waldman (1996) aggressive boys showed hostile biases but not general deficits. It was discovered that aggressive boys may have a tendency to view hostility where it does not exist. An alternative hypothesis may be that they are more accurately viewing situations as aggressive than other boys. Aggressive boys are less able to access nonaggressive responses (Dodge, Pettit, McClaskey, & Brown, 1986) and may be less likely to inhibit aggressive responses. Thus, as in Dodge and Coie (1987), Waldman (1996) found more aggressive responses in aggressive boys, both in clearly hostile and ambiguous situations.

Summary

Researchers have devoted much attention to unpopular and rejected children's later life adjustment and the underlying causes for their unpopularity. Differences in social information processing have been found to exist between popular and unpopular children, with unpopular children displaying deficits in solving challenging social problems. The integral function of anger in the social information-processing of aggressive boys has been investigated in depth by many researchers. Kenneth Dodge, (Dodge, 1980; Dodge & Newman, 1981; Dodge & Frame, 1982; Dodge & Somberg, 1987; Dodge & Crick, 1990), has done extensive research on the biased social information processing of aggressive and rejected school-age boys. Biased social information processing has also been seen in children's use of gender stereotyped information. Studies have also found that arousal affects children's responses to challenging peer situations with more aggressive responses occurring from aggressive children when faced with conditions of "threat to the self".

Purpose of the Study

Although much research has been conducted on the biased social information processing of aggressive school-age boys, relatively little has been done investigating the social information processing of preschool-age children. Crick and Dodge (1994) have attributed this lack of research with young children to the length of time it takes to obtain data from preschoolers and the cost in conducting research with this age-group. They state that research with older children can be conducted through the use of interviews and paper and pencil measures whereas younger children often require the use of puppets and pictures. Despite the extra effort required to conduct studies with preschool-age children, it is important to include preschoolers in studies examining social information processing because peer rejection occurs very early in childhood and it is necessary to recognize deficits and biases in preschoolers' information processing strategies in order to provide early intervention. This study was restricted to the use of boys because the procedures used to assess the level of aggression of responses were better suited to measuring the type of aggression that is more often demonstrated by boys than girls. Boys are more likely to demonstrate instances of physical and verbal aggression than girls, whereas girls are more likely to engage in relational aggression (Crick, 1995).

It is also of interest to determine whether children who respond more aggressively in problematic peer situations also display less tolerance for children engaging in gender-inconsistent behavior.

Experiment 1

Hypotheses

Hypothesis I: Arousal and aggressive cues will lead to more aggressive responding of preschool-aged children in problem-solving situations than no arousal and neutral cues.

Hypothesis II: Arousal and aggressive cues will lead to less tolerance for children engaging in gender-inconsistent play.

Hypothesis III: A positive correlation is expected between subjects' playground behavior and their responses in the experimental conditions. Subjects rated as aggressive on the playground will respond more aggressively in the hypothetical conflict situations and have less tolerance for children engaging in gender-inconsistent play.

Method

Experiment 1:

Participants

Subjects in this experiment were 60 preschool boys ages 42-60 months, (M = 58.85 months, SD = 3.30), who were attending one of ten participating child care facilities in the Des Moines area. Ninety percent (54) of these boys were Caucasian, 6.67% (4 boys) were African American, and 3.33% (2 boys) were Asian American. Participating child care centers included in this study were Kids Express in West Des Moines, Formative Years in Clive, Koalaty Time Child Care Center in West Des Moines, Apple Tree Children's Center in Urbandale, Valley Children's Center in West Des Moines, two Apple Tree Children's Centers in West Des Moines, West Des Moines Head Start, Delaware Head Start, and Koalaty Time Too Child Care Center in Urbandale. Head Start is a governmentally funded program which provides children from low-income families an opportunity to get a "head start" on learning before

entering kindergarten. To be eligible for enrollment in the Head Start program, families must have an annual income of less than $10,000 per year. Including children from two of the Head Start programs in the Des Moines area in this study added socio-economic diversity to the subject pool. Nine children (15% of the subjects) attending the West Des Moines Head Start program participated. Three children (5% of the subjects) attending the Delaware Head Start program in Des Moines were also participants. Of these twelve Head Start children, seven were randomly assigned to the arousal condition while five were randomly assigned to the control condition. Permission to participate in this research was obtained from both the child care directors and the children's parents by signing an informed consent form. In addition, the child's consent to participate was requested verbally, and no child was included in the research if he did not wish to participate.

Materials

An audio tape of 80 dB white noise was used in the arousal condition. White noise has been shown to increase arousal and create negative affect in adults (Paulhus, Martin, & Murphy, 1992). I chose this method of arousal manipulation because it provided a controllable and continuous amount of stimulation and allowed the preschoolers to participate in a conflict resolution task and a stereotyping task while being subjected to the white noise. White noise was measured using a sound level meter.

A heart rate monitor was used in both conditions to measure physiological arousal. This method was used by Anderson, Deuser, and DeNeve (1995) and proved for them to be an appropriate measure of subtle physiological arousal. This monitor was shaped like a small baton and obtained heart rate measures very quickly by having the child hold the monitor in the palm of his hand. This monitor was chosen because of

its unobtrusive nature and because it was believed to be less uncomfortable and anxiety provoking than other methods (e.g., obtaining blood pressure).

Three posters depicting aggressive scenes involving preschool children fighting were used in the Arousal condition. The first of these posters pictured two girls fighting. One girl was hitting the other. The girl that was getting hit was crying. The second poster showed two boys fighting. One boy, the bigger of the two, was chasing the other. The boy being chased had a scared look on his face. The final poster depicted two boys in an argument. One boy hit the other boy on the head with a ball. The boy that got hit looked frightened.

Three posters depicting active scenes involving preschool children playing were used in the Control condition. The first poster depicted three children, two boys and a girl, playing in a sprinkler. The second poster showed two children playing with a toy telephone. Finally, the third poster depicted a boy taking a picture of a girl with a toy camera. These scenes were selected because of the active nature of the pictured children and the neutral activities they were engaging in.

Three boy puppets were used to enact the six hypothetical conflict situations. The hypothetical conflict situations were relevant to preschoolers' developmental level and encompassed some peer interactions they may encounter in daily situations. These situations were taken from Mize and Ladd (1988). These situations appear in Table 1. Subjects' responses to the conflict situations were rated on a 7-point scale; 1--highly prosocial, 2--moderately prosocial, 3--slightly prosocial, 4--neutral, 5--slightly aggressive, 6--moderately aggressive, 7--highly aggressive.

Table 1

Six Hypothetical Conflict Situations from Mize and Ladd (1988)

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1. "Pretend that you are playing with this boy." The 2 children play together for a brief moment when a third child approaches and pushes the subject's playmate and says to the subject, "I want to play with you."
2. "Now let's pretend that you are playing in the sandbox with this boy." The 2 children are having fun in the sand when the peer says to the subject, " I'm tired of playing in the sand; I'm going to play with the blocks."
3. "Now let's pretend that you are playing with blocks. You are building a tall tower." Another peer approaches and says, "I was playing with those before and you can't play with them," and knocks down the subject's tower.
4. "Now let's pretend you are playing by yourself with the blocks." Nearby a peer is teasing a third child, "You are a big baby!" The third child is crying.
5. "Now let's pretend that you see 2 children playing and you walk over to them." The children are playing with farm animals; blocks, a truck, and a small doll lie nearby, unused. The peers say, "You can't play because we only have two farm animals."
6. "Now let's pretend that you aren't doing anything and you see two children playing." The children are playing with blocks. Other toys lie nearby, unused.

Six pictures (3 boys and 3 girls) were used in each of the two stereotyping tasks. Each gendered picture was seen playing with one of each type of toy; a stereotypical toy for that gender, a counterstereotypic toy for that gender, and a gender neutral toy. Toys have been a popular tool for studying children's gender stereotypes. According to Peretti and Sydney (1984), toys are used to aid children in gender and social-role identities. The six pictures used in these studies are similar to those used in a study assessing the development of gender discrimination among young children conducted by Etaugh and Duits (1990). Subjects' "liking" responses were based on how much they would like to play with the pictured child and were rated on a 7-point smiley-face scale: 1--will not play with, 2--would really not like to play with, 3--would not like to play with, 4--indifferent, 5--would like to play with, 6--would really like to play with, 7--would love to play with. Children were asked to point to the smiley-face which best corresponds to their response. According to Denham & Bouril, this type of rating scale is appropriate for four-year old children due to their overall proficiency and accuracy in recognizing different emotions by looking at faces (1990). Training in the use of this scale for each subject preceded the presentation of the pictures.

Design and Procedure

Subjects were randomly assigned to the arousal or control condition until there were 30 boys in each. At each child care facility the subjects' teachers received a list of names of those boys in their classrooms who had been given permission by their guardians to participate. The teachers then sent the subjects in no particular order to the experimenter and were placed in the next ordered condition based on the predetermined order. All subjects participated in six hypothetical conflict situations and two stereotyping tasks. The order which these situations and tasks were presented to the subjects were also randomly predetermined. The hypothetical conflict task preceded the stereotyping tasks for all subjects. Counterbalancing these tasks was considered

but decided against due to the primary importance of the responses in the hypothetical conflict situations. Testing occurred in a quiet room in each child care setting. The length of these tasks was approximately 20 minutes per subject with approximately ten minutes allowed for each task.

Subjects in the arousal condition had their heart rates measured at the beginning of the project to establish a baseline measure. A tape of 80 dB white noise was then played over a tape recorder in order to manipulate arousal. This tape was played continuously throughout the entire experiment.

Each subject was then presented with three posters depicting either aggressive or neutral cues, depending on their assigned condition. As a manipulation check, each child was asked, "What are these kids doing?" Each child was also asked, "How would you feel if you were asked to play with [one of the pictured children]?" In the presentation of posters depicting aggressive cues, the child was asked how he would feel if asked to play with the aggressive child pictured. A heart rate measure was taken at this point.

The two factors, arousal and aggressive cues, are confounded within the design of the study. Running the two intermediate cells, to separate the effects of noise and aggressive cues was initially considered and decided against. It would have required too many subjects to examine differences between four conditions (noise and cues, noise only, cues only and control) when a small to moderate effect size was expected. The decision was made that it was more important to demonstrate a hostile attributional bias among the boys in the arousal condition, than to differentiate the effects of the noise and the aggressive cues.

After the presentation of the cues, each subject was given a puppet that represented "me" throughout the six hypothetical conflict situations. Each boy was told that the puppet had the same name as he did and that the puppet would do everything that he would do. Each hypothetical situation involved active participation from the boy

in order to get his enactive and automatic responses. Enactive responses, as described by Mize and Ladd (1988) and Rabiner, Lenhart, and Lochman (1990) elicit more biased social-information processing than other types of responses. All of the puppets in each of the hypothetical situations were the same sex as the subject. This was done to eliminate confounding of sex with aggressive behavior that could affect responses in the stereotyping task. Also, Martin (1989) demonstrated that children prefer to play with children the same sex as themselves.

Subjects' responses to the six conflict situations were recorded on audio tape so that raters, blind to the hypotheses, could rate the responses on a 7-point behavior response scale. If subjects' responses were nonverbal or inaudible, the experimenter restated the response in question form for the child to confirm. A heart rate measure was obtained at the conclusion of the problem-solving task.

Each subject then participated in the two gender stereotyping tasks. Gender has been referred to by Maccoby (1988) as "a powerful organizer of social functioning" in children (p. 762), therefore, rendering gender an easily accessible schemata among the currently studied population. First, the subjects were trained in the use of the 7-point smiley-face rating scale. Once they had demonstrated an understanding of the rating scale, six pictures representing preschool-age children were then presented. Two of the pictured children were seen playing with gender stereotyped toys (e.g., a boy playing with a truck or a girl playing with a doll), two were seen playing with gender counterstereotyped toys (e.g., a boy playing with a doll or a girl playing with a truck), and two playing with gender neutral toys (e.g., a boy or a girl painting a picture). Subjects were first asked to state what each pictured child was playing with in order to confirm that attention was drawn to the toy. Subjects were then asked to rate how much they would like to play with each of the six pictured children by pointing to a face on the 7-point smiley-face scale. This task is similar to the one used in the Martin (1989) study.

A rating task followed the initial stereotyping task. Subjects were shown all three boy pictures at once and were asked to point to the boy they would most like to play with. This picture received a "1" rating and was removed from the set of three. The subjects were then asked to point to the one of the remaining pictures that they would now most like to play with. This picture received a rating of "2", and the final picture received a "3" rating. Next, the subjects were shown the three girl pictures and repeated the procedures described above. By observing the boys' responses to this stereotyping task in the initial pilot study, it became apparent that the boys were likely to report a strong desire to play with all of the pictured children. They were not likely to respond with much variability unless they had been exposed to all of the pictures. Therefore, this task was used to ensure variability in the subject's responses in anticipation of a ceiling effect in responding to the first stereotyping task.

At the end of the experiment, the white noise was turned off in the arousal condition. The researcher again took a heart rate measure as a manipulation check for arousal. A self-report of feelings was obtained from each subject in order to determine if the presence of white noise was correlated with negative affect.

A debriefing was conducted following the stereotyping tasks to counter the arousal and aggressive cues experienced earlier in the experiment. Each child listened to a short, "happy" song on an audio tape and was given a small prize for participating.

In addition to responses obtained from the experimental conditions, playground behavior was observed by two raters other than the experimenter. This observational data was rated and used to assess the predictive validity of experimental response behaviors for actual behavior. As Dunn (1991) notes, obtaining naturalistic behavior in studies with children is important because of the insight that can be gained into how similarly children process information about what puppets do or think and what real children do and think. It is possible that experimental methods of studying children's

social information processing may lack certain subtleties that can only be recognized through naturalistic data.

Playground behavior was coded by two raters blind to the hypotheses of this study. A coding procedure was borrowed from Dodge, Coie, Pettit, & Price (1990). Raters coded two aspects of each child's behavior: verbal and physical aggression. Verbal aggression was defined as an attack on an individual's self-concept in order to make the person feel less favorably about the self. This definition comes from Infante & Wigley (1986). This behavior was coded as either provoked or unprovoked. Physical aggression was defined as hurting or attempting to hurt another child. This definition was taken from Dodge (1980). Physical aggression was also coded as either provoked or unprovoked. A tally system was used to record instances of observed aggression.

Results

Experiment 1:

An alpha level of $p < .05$ was chosen to determine statistical significance for all analyses. To assess differences in four-year old boys' social information processing between those in the arousal condition and the control condition, an analysis of variance was conducted. The dependent variable being assessed was the child's level of aggression in response to six hypothetical conflict situations. Aggression and assertion were originally rated as two separate constructs because some responses among pilot subjects to the hypothetical situations were clearly assertive and represented the child "taking charge" of the situation, such as telling a teacher or parent about the conflict or asking the peer not to do that again, without displaying aggressive behaviors. These situations would therefore have been rated moderately on the aggressive behavior scale and somewhat high on the assertiveness scale. These types of responses were

prevalent enough to warrant rating them on two separate scales; aggression and assertion.

Aggression and assertion were assessed by two raters blind to the hypotheses of this study. Interrater reliability was determined using Cohen's Kappa. Cohen's Kappa is a stringent measure of interrater reliability which is corrected for the fact that some agreement between raters occurs by chance alone (Bakeman & Gottman, 1986). Using this method, interrater agreement was K = .70 for ratings of aggression, a measure that indicates acceptable reliability, according to Bakeman & Gottman (1986) and K = .76 for ratings of assertiveness of responses. Instances where the two raters disagreed were reconciled by a third rater, also blind to the hypotheses of this study.

Aggression ratings and assertion ratings were highly correlated according to a Pearson-Product Moment correlation of $r = .99$. Due to the extremely high correlation between aggression and assertion ratings, it was decided that only the aggression data would be reported to avoid redundancy.

An analysis of variance using aggression as the dependent variable yielded a significant main effect of condition. The first ANOVA provides evidence that the boys in the two conditions differed in their social information processing with the boys in the arousal condition providing significantly more aggressive responses to the six situations than the boys in the control condition, $F(1,58) = 41.87$, MSE = 29.24, $p < .0001$. See Table 2 for means and standard deviations. The effect size for the aggression data in this was found to b ean estimated w2=.405 and eta-squared=.384.

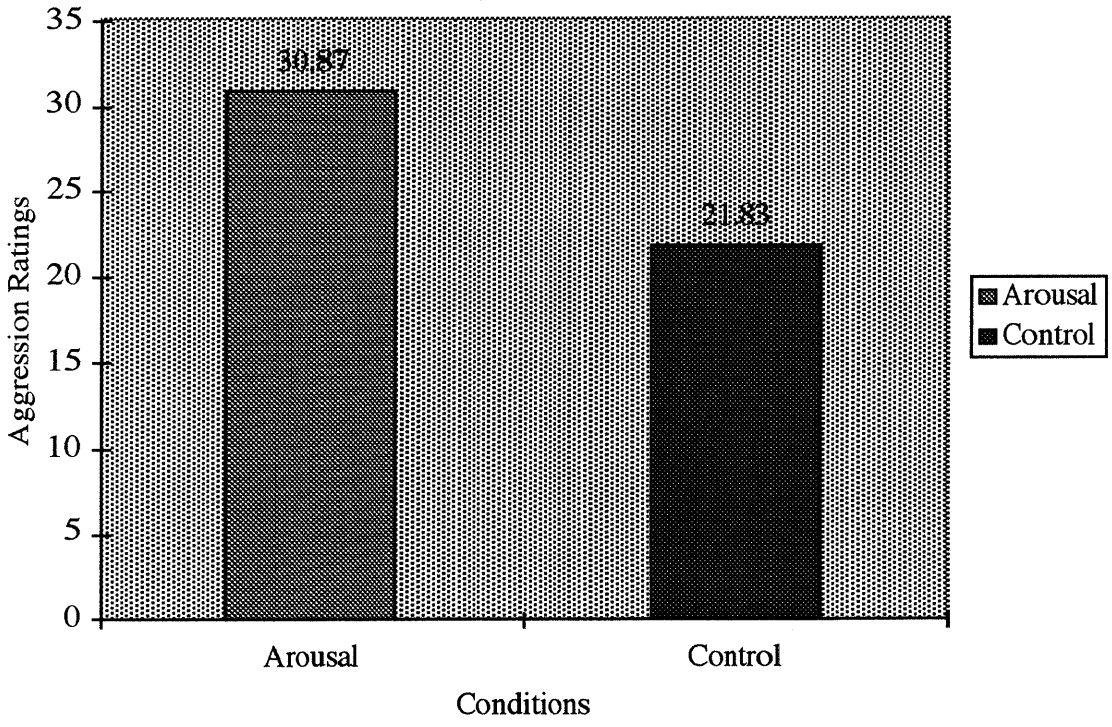
Table 2

Experiment 1: Aggression Means and Standard Deviations

Condition	Mean	Standard Deviation
Control	21.83	3.92
Arousal	30.87	6.56

Figure 2

Experiment 1: Aggression Means by Condition



Two raters, blind to the hypotheses of this study, observed the subjects on the playground and recorded their rate of aggressive behavior. Interrater reliability, as

calculated using Cohen's Kappa, was K = .36. The data from the first rater was correlated with the subjects' rates of aggression in their responses to the hypothetical situations. No significant correlation was found between boys' level of aggression in response to the hypothetical situations and their level of aggression on the playground. Similarly, there was no significant correlation between boys acting more aggressively on the playground and boys acting more moderately on the playground and their responses in either the hypothetical situations or the stereotyping tasks. It cannot be determined whether these differences might have been found if the interrater agreement in the observational data had been higher.

There were no significant differences found between conditions in heart rate measures or self-reports of affect in this experiment. This lack of significance prohibits the difference between groups in level of aggression and assertion in responses being directly attributed to the white noise present in the arousal condition.

A MANOVA was conducted to determine whether there were significant differences between conditions in boys' responses in the two stereotyping tasks (liking and rating). The MANOVA yielded no main effect of condition. A significant two-way interaction was found between gender of the pictured child and the stereotypicality of the toy, $F(2, 57) = 429.12$, $p < .0001$.

A mixed model analysis of variance was also conducted to determine whether differences existed in boys "liking" or desiring to play with children pictured with either stereotypically consistent, inconsistent, or neutral toys and whether differences existed in the children's rating of these pictures. This ANOVA did not reveal any significant effects of condition.

Significant results were found, however, when examining differences in the boys' "liking" or desiring to play depending on the stereotypicality of the toys the pictured children were shown with, $F(2, 116) = 14.75$, $MSE = 2.86$, $p < .0001$. Follow-up pair wise comparisons were conducted to determine where these differences

occurred. There was also a significant gender by level of stereotypicality interaction, F (2, 116) = 4.66, MSE = 2.61, $p < .011$. Significant differences between means are indicated in Table 3. Differences are considered to be significant when $p < .003$ using Bonferroni's correction.

Table 3

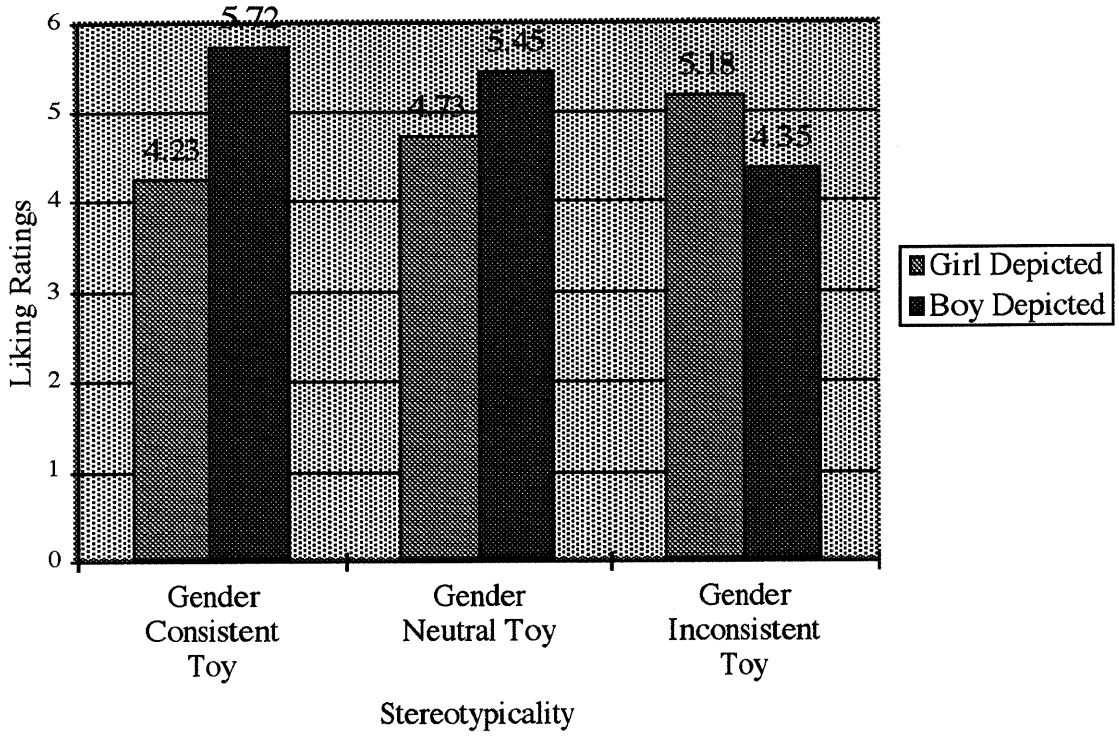
Experiment 1: Combined Means of Liking Data from Stereotyping Task

Sex of Picture	Stereotypicality of Toy	"Liking" Mean	St. Dev.
Girl	Consistent [a]	4.23	2.134
Girl	Neutral [a,b]	4.73	2.208
Girl	Inconsistent [b,c]	5.18	1.935
Boy	Consistent [b]	5.72	1.688
Boy	Neutral [b]	5.45	1.789
Boy	Inconsistent [a,c]	4.35	2.269

Note: Means sharing the same superscript were not significantly different from each other.

Figure 3

Experiment 1: Liking Means from Stereotyping Task



There was also a significant effect of level of stereotypicality when the boys' rating data was assessed, $F(2, 116) = 36.75$, MSE = .79, $p < .0001$. A significant gender by level of stereotypicality was also found in assessing the boys' rating of "liking to play with", $F(2, 116)$, MSE = .35, $p < .021$. Follow-up pairwise comparisons were conducted to determine differences between means. These differences are indicated in Table 4 below. Differences were considered statistically significant at $p < .003$ using Bonferroni's correction.

Table 4

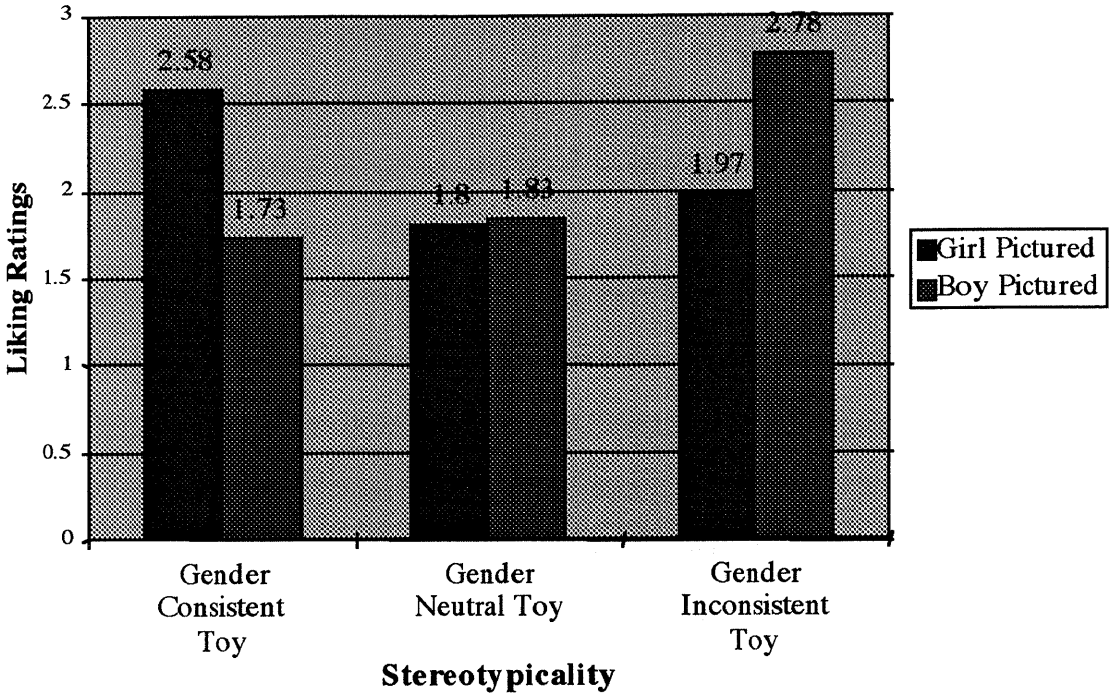
Experiment 1: Combined Means of Rating Data from Stereotyping Task

Sex of Picture	Stereotypicality of Toy	Mean	St. Dev.
Girl	Consistent [a]	2.58	1.062
Girl	Neutral [b]	1.80	1.219
Girl	Inconsistent [b]	1.97	1.221
Boy	Consistent [b]	1.73	1.163
Boy	Neutral [b]	1.83	1.21
Boy	Inconsistent [a]	2.78	0.976

Note: Higher means indicate lower desire to play with. Means sharing the same superscript were not significantly different from each other.

Figure 4

Experiment 1: Ratings Means from Stereotyping Task



Discussion

Experiment 1:

On the basis of past research suggesting that aggressive boys respond more aggressively than their nonaggressive counterparts in conditions of threat to the self in hypothetical conflict situations, it was hypothesized that by biasing the social information processing of preschool-age boys through the use of aggressive cues and white noise, the same effect would be found. As was hypothesized, boys responded more aggressively in hypothetical conflict situations when their social information processing was biased in the encoding and interpretation phases by noise and

aggressive cues than boys who were not exposed to these environmental factors. More aggressive responses were provided by the boys in the arousal condition, such as the use of physical aggressive to respond to their peers' provocation, than were provided by the boys in the control condition.

There was no significant correlation found between boys' level of aggression in response to the hypothetical situations and boys' level of aggression on the playground. There was also no significant correlation between boys with high rates of aggression on the playground and those with lower rates of aggression when comparing the level of aggression and tolerance for children pictured with gender inconsistent toys. There were significant difficulties obtaining agreement between raters on the number of aggressive acts that were witnessed in the observational data from the playground. This low interrater reliability made it difficult to obtain correlations with other measures of aggression that had adequate interrater agreement. Steps to increase interrater agreement were taken. Raters discussed difficulties they had encountered in the first experiment and measures to correct these difficulties were utilized in the second experiment. These steps included more precise measures for recording aggressive acts and a clarification of which acts should be recorded.

The hypothesis that states that boys in the arousal condition will be less likely to want to play with children shown playing with stereotypically inconsistent toys (i.e., a boy with a doll, or a girl with a truck) than will boys in the control condition, was not supported. Although there were no significant differences between conditions, there were interesting interactions across conditions.

When boys were asked to rate how much they would like to play with the pictured children, they were significantly more likely to indicate a desire to play with boys shown pictured with trucks or painting, than with boys with dolls. They were also more likely to indicate a desire to play with boys shown pictured with trucks or painting than girls shown pictured with dolls or painting. The most interesting finding

was that boys would rather play with girls shown pictured with trucks than with boys shown pictured with dolls. Although it appears that boys would rather play with boys than with girls, as has been shown previously in the stereotyping literature, it is also apparent that they would rather play with a girl, if she has a truck, than a boy, if he has a doll. It becomes apparent from these findings that the key issue for these boys is the presence of the doll in these pictures. Boys are less likely to choose to play with a doll no matter what the sex of the pictured child.

In the rating task in which the boys were asked to rank order the pictured girls and the pictured boys in the order they would like to play with them, it was discovered that boys would first like to play with boys with paints or trucks and last with boys with dolls. The opposite was found for the pictured girls, however. Boys would rather play with girls shown with trucks than with girls with paints or dolls. One suggestion for this finding may be that the toy was more salient in these situations than the gender of the pictured child. The anti-doll finding is finding is clearly portrayed through the boys' responses in this task.

This study has demonstrated that boys exposed to noise and aggressive cues act more aggressively than boys who are not exposed to these stimuli when the intent of the actors in the hypothetical conflict situations is hostile. In light of the fact that in many situations the intent of the actors is ambiguous and that in some studies the difference between aggressive and non-aggressive children is strongest in ambiguous situations (e.g., Dodge, 1980), a second experiment using ambiguous situations should provide important evidence on the generality of the effects of noise and aggressive cues. Whether the bias in information processing displayed by the boys in the arousal condition is still apparent when hypothetical situations enacted are ambiguous in nature, as opposed to hostile or provoking was examined in Experiment 2. Ambiguous situations have been used in a number of studies with school-age boys as subjects (Dodge, 1980; Dodge & Frame, 1982; Dodge & Newman, 1981). These studies have

been successful in demonstrating a hostile attributional bias in these aggressive populations. The purpose of the second study is to examine the social information processing of the younger, preschool population of boys not selected for aggression and to determine whether the bias present in the first experiment carries over to ambiguous situations.

Experiment 2

Hypotheses:

Hypothesis I: Arousal and aggressive cues will lead to more aggressive responding of preschool-aged children in problem-solving situations in which the intent of the main character is ambiguous, than no arousal and neutral cues.

Hypothesis III: Arousal and aggressive cues will lead to less tolerance for children engaging in gender-inconsistent play.

Hypothesis III: A positive correlation is expected between subjects' playground behavior and their responses in the experimental conditions. Subjects rated as aggressive on the playground will respond more aggressively in the hypothetical conflict situations and have less tolerance for children engaging in gender-inconsistent play.

Method

Experiment 2:

Participants

Subjects in this experiment were 60 preschool boys ages 42-60 months, (M = 53.48, SD = 3.53), who were attending one of ten participating child care facilities in the Des Moines area. Of the subjects, 86.67% (52) of these boys were Caucasian,

10% (6 boys) were African American, and 3.33% (2 boys) were Asian American. Participating child care centers included in this study were Busy Bee Child Care in Des Moines, Country Club Child Care Center in West Des Moines, Boulevard's Children's Center in Des Moines, Bear Basics in Des Moines, Aurora Business Park Child Care in West Des Moines, The Childrens' Place at Farm Bureau in West Des Moines, Apple Tree Children's Center in West Des Moines, Traditions Children's Center in West Des Moines, Creative Center for Children in Des Moines, and Des Moines Christian Preschool and Child Care.

Materials

The same materials described in Experiment 1 were used in Experiment 2 with the exception of the six hypothetical situations. This change is described below.

Design and Procedure

The procedures followed in this experiment were identical to those in Experiment 1, with the exception of the six hypothetical conflict situations enacted. Instead of using the hypothetical conflict situations used in Mize and Ladd's study (1988) examining the information processing of aggressive boys, six new hypothetical situations were developed. See Table 5 below. These situations were created to be equally developmentally appropriate for preschool children. The intent of the provocateur in these new situations was designed to be ambiguous in nature, as opposed to the hostile intent evident in several of the situations used in Experiment 1.

Table 5

Six Hypothetical Ambiguous Situations Used In Experiment 2

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1. The subject builds a tower with blocks. Two children are playing and one knocks the subject's tower over. The child says, "Oops," and continues to play.
2. Two boys are playing with farm animals. The subject walks over to them and asks, "Can I play with you guys?' One child responds, "We're done playing," and walks away from the toys.
3. Two boys are playing catch while the subject plays with the blocks. The ball flies out of one boy's hand and hits the subject on the head. The other boy says, "Hey, Can you give me that?"
4. The subject is drawing a picture when another child spills some marbles that roll onto the subject's picture. The child who drops the marbles says, "Uh-Oh" and begins to pick them up.
5. The subject is playing with the truck when another child approaches him and says, "Can I play with that?"
6. The subject and two other children are playing together when one child says, "I don't want to play here anymore."

It is hypothesized that, based on past research measuring aggression through the use of ambiguous situations (Dodge, 1980; Dodge & Frame, 1982; Spetter, La Greca, Hogan, & Vaughn, 1992), that this hostile attributional bias will be demonstrated through significantly more aggressive responses by boys in the arousal condition as compared to the responses of the boys assigned to the control condition.

Results

Experiment 2:

Data was analyzed similarly to that in Experiment 1 with $p < .05$ chosen as the alpha level needed to attain statistical significance. The same dependent variable, aggression, was assessed in the second experiment. The children's responses were rated on two seven-point scales assessing level of aggression by two raters blind to the hypotheses of this study. Interrater reliability was determined using Cohen's Kappa. As in Experiment 1, aggression and assertion were originally rated as two separate concepts, but due to an extremely high correlation between the two variables ($r = .98$), the aggression data will be reported alone. Interrater reliability for aggression ratings was determined to be $K = .75$. This measure is considered to be respectable according to Bakeman and Gottman (1986). Instances where raters disagreed were reconciled by a third, independent rater, also blind to the hypotheses of the study.

An analysis of variance was conducted to determine whether there were differences between boys' responses to the six hypothetical conflict situations in the two conditions. The ANOVA yielded a significant effect of condition, $F(1, 58) = 6.81$, $p < .002$. This ANOVA assessing the dependent variable aggression yielded a significant main effect of condition, $F(1, 58) = 11.10$, $MSE = 25.24$, $p < .002$. Boys in the arousal condition responded with significantly more aggression to the hypothetical situations, than did boys in the control condition. Means and standard deviations are listed in Table 6. The effect size for the aggression data in this study is equal to an estimated $w2 = .140$ and eta-squared = .396.

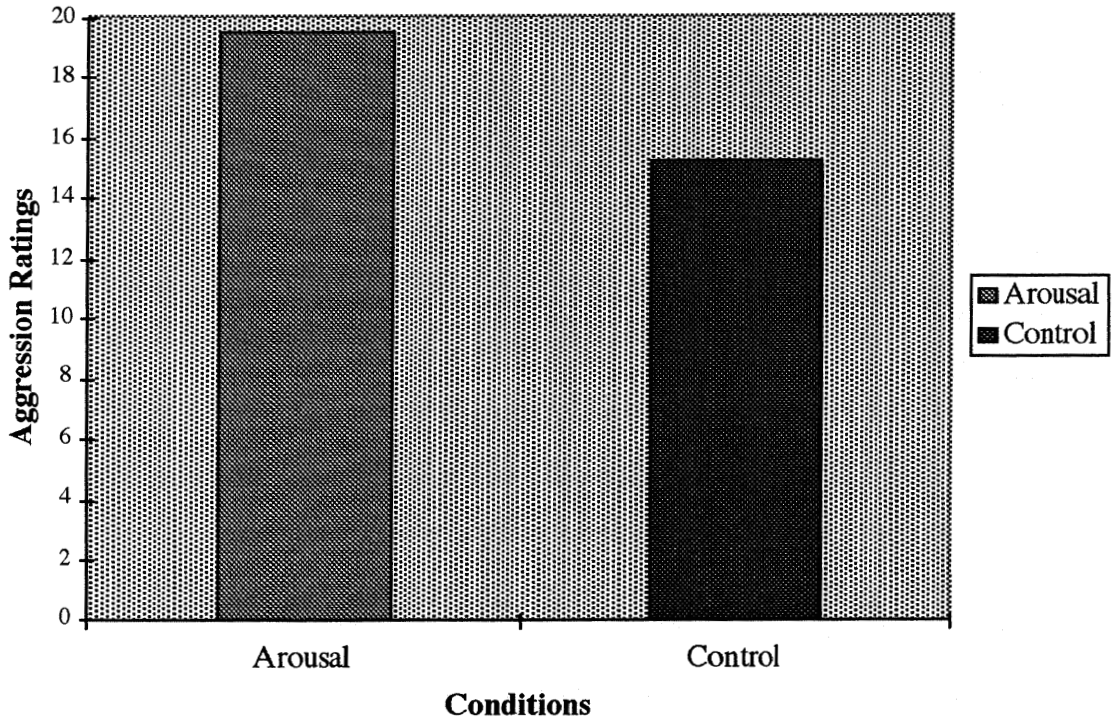
Table 6

Experiment 2: Aggression Means and Standard Deviations

Condition	Mean	Standard Deviation
Control	15.19	4.88
Arousal	19.52	5.18

Figure 5

Experiment 2: Aggression Means by Condition



Similar to Experiment 1, two raters obtained playground data from these 60 boys, which was to be correlated to their rates of aggression to the hypothetical situations. Interrater reliability for this observation data was K = .86, using Cohen's

Kappa. This is considered acceptable interrater reliability, according to Bakeman and Gottman (1986). This data was then correlated with the aggression data. The correlation was determined to be $r = .13$. This finding did not support the hypothesis stating that playground data should correlate with aggression data. There was also no difference found between the level of aggression and tolerance for children pictured with gender inconsistent toys by boys who were rated as aggressive on the playground and those rated more moderately.

There were no significant differences between boys in the arousal and control conditions in heart rate measures or self-reported affect as a result of exposure to the white noise. This lack of significance prohibits the differences between aggressive and assertive responses for boys in the arousal and control conditions being directly attributed to the presence of the white noise.

A multivariate analysis of variance was conducted to determine whether there was significant difference between conditions on measures of boys' tolerance for children pictured with gender consistent toys obtained from the two stereotyping tasks. There was no significant main effect of condition. The MANOVA yielded a significant two-way interaction between the gender of the pictured children and the stereotypicality of the toy, $F(2, 57) = 427.79$, $p < .0001$.

A third, mixed model analysis of variance was conducted to determine whether there were significant effects of condition when assessing gender and consistency of toy pictured. No significant main effect of condition was found for either the liking data or the "rating" data. There was a significant gender by consistency interaction, $F(2,116) = 5.46$, $MSE = 4.11$, $p < .005$, found when analyzing the liking data. No significant consistency effects were found. The significant interaction was further investigated using follow-up pairwise comparisons. Significant differences between means are indicated in Table 7. Differences were considered significant when $p < .003$ using Bonferroni's Correction.

Table 7

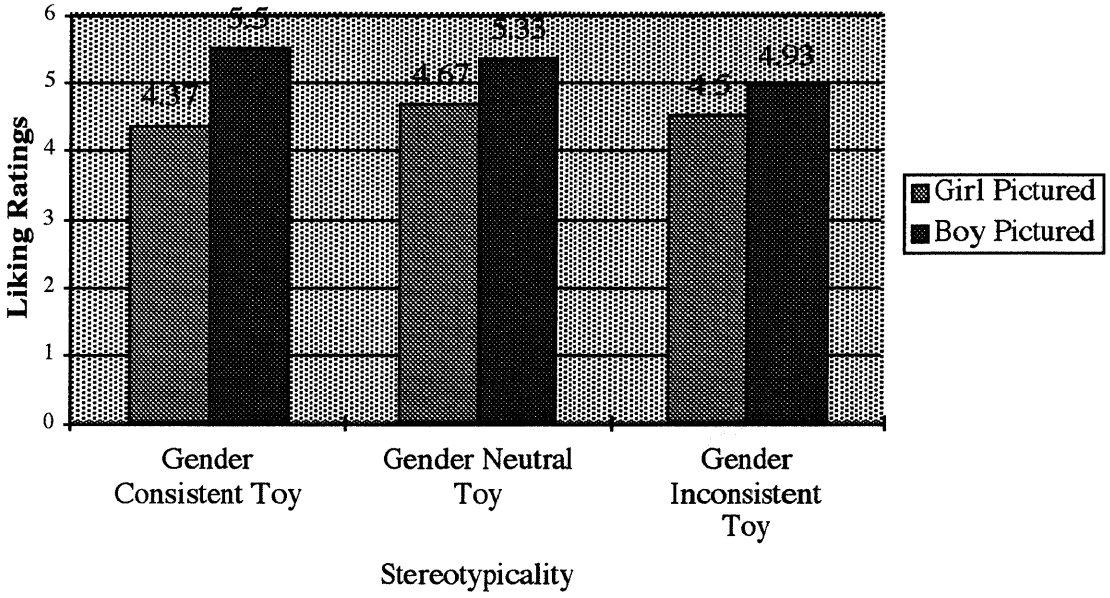
Experiment 2: Combined Means of Liking Data from Stereotyping Task

Sex of Picture	Stereotypicality of Toy	Mean	St. Dev
Girl	Consistent [a]	4.37	2.000
Girl	Neutral [a,b]	4.67	2.080
Girl	Inconsistent [b,c]	4.50	2.103
Boy	Consistent [b]	5.50	1.882
Boy	Neutral [b]	5.33	1.612
Boy	Inconsistent [a,c]	4.93	1.803

Note: Means sharing the same superscript were not significantly different from each other.

Figure 6

Experiment 2: Liking Means from Stereotyping Task



There was a significant consistency effect found when assessing the "rating" data, $F(2, 116) = 7.22$, $MSE = 1.19$, $p < .001$. Follow-up pairwise comparisons were conducted to determine where the significant differences lie. These differences are indicated in Table 8. Differences were considered statistically significant at the $p < .003$ level using the Bonferroni correction.

Table 8

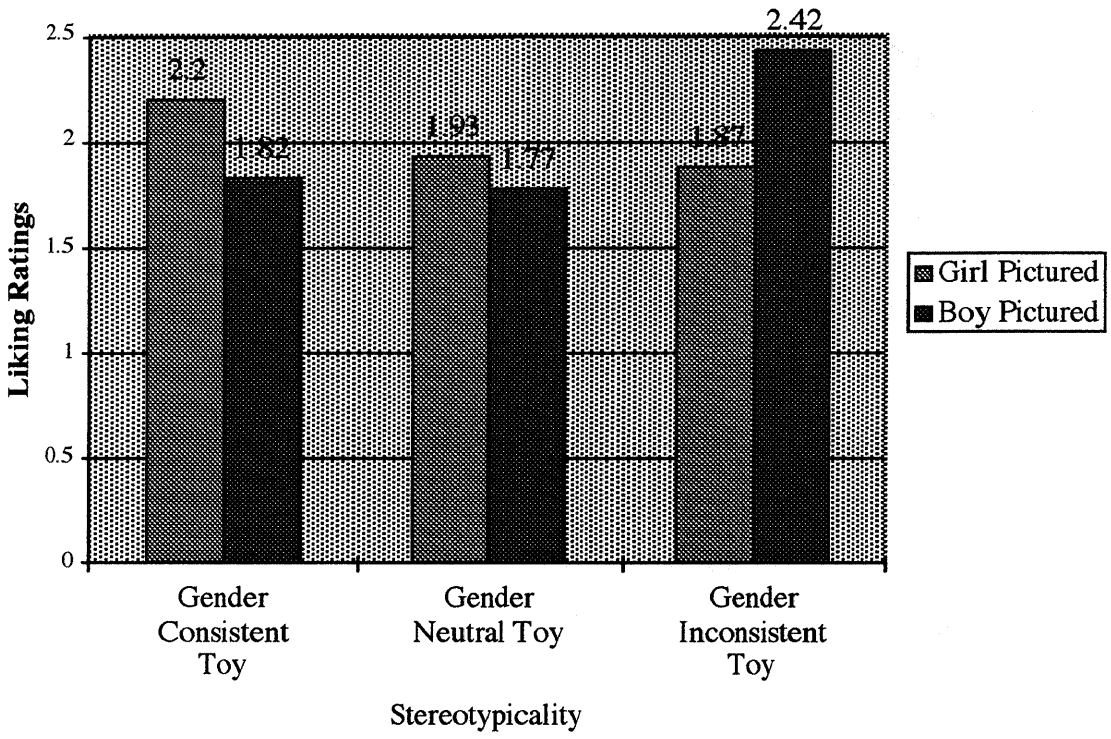
Experiment 2: Combined Means of Rating Data from Stereotyping Task

Sex of Picture	Stereotypicality of Toy	Mean	St. Dev.
Girl	Consistent [a]	2.20	.879
Girl	Neutral [b]	1.93	.756
Girl	Inconsistent [b]	1.87	.791
Boy	Consistent [b]	1.82	.833
Boy	Neutral [b]	1.77	.745
Boy	Inconsistent [a]	2.42	.720

Note: Higher means indicate lower desire to play with. Means that share superscripts are not significantly different from each other.

Figure 7

Experiment 2: Ratings Means from Stereotyping Task



Discussion

Experiment 2:

The purpose of this study was to determine whether the hostile attributional bias, apparent in Experiment 1, can be seen when ambiguous situations are substituted for the Mize and Ladd (1988) situations which were more hostile in intent. The second study demonstrates that preschool-age boys are more likely to aggress in ambiguous situations when their social information processing is biased in the encoding and interpretation steps. These boys, presumably, are more willing to attribute the provocateur's intent in these types of situations as hostile and therefore respond, both more aggressively and more assertively, than boys whose information processing stages are not biased. These findings support the first hypothesis and also support

previous research in this area (Dodge, 1980; Dodge & Frame, 1982; Quiggle, Garber, Panak, & Dodge, 1992).

The stereotyping data did not support the hypotheses of this study. There were no differences between the arousal condition and the control condition when examining tolerance for children pictured with stereotyped inconsistent toys. Significant effects were found, however, when examining findings across conditions. It was determined that boys would rather play with boys than girls, when the toys they are pictured with are either stereotypically consistent with the gender, but not when the toys are stereotypically inconsistent with that gender. In other words, boys would rather play with boys unless the boy is playing with a doll. When deciding whether or not the boys would like to play with girls, it was clear that they mostly wanted to play with girls with trucks. Boys appear to be very opposed to playing with dolls and clearly prefer to play with trucks or paints despite the sex of the child pictured. These findings are similar to those of Experiment 1.

General Summary and Conclusion

These studies examined the effects of white noise and the presentation of aggressive cues on preschoolers' information processing in conflict situations. It was determined that boys who are exposed to noise and aggressive cues during the encoding and interpretation stages of social information processing, are more likely to respond with aggression than are those boys who are not exposed to these stimuli. These stages of social information processing are described in Crick and Dodge (1996). The encoding stage of information processing involves the child selectively attending to internal or external cues which he or she must then interpret by assigning causality or an evaluation of meaning. Following the interpretation of cues, the child selects a goal or desired outcome, or continues with a predetermined goal, using a focused state of arousal to achieve this desired outcome. The next stage describes the

search through the child's memory base for an appropriate behavioral response based on the environmental cues. If new stimuli have been encoded, it may be necessary to construct a new behavioral sequence in order to respond in a way that facilitates goal achievement. Once all these behavioral responses have been evaluated by the child, the one chosen from the memory base will be behaviorally enacted. This model of social information processing has been used to determine the preceding temporal causes to children's aggressive behavior. Changing or adapting children's information processing so that they make less hostile interpretations of other children's behavior leads to the reduction in their subsequent aggressive behavior (Bierman, 1986; Dodge, Bates, & Pettit, 1990; Guerra & Slaby, 1990; Hudley & Graham, 1993; Rabiner & Coie, 1989).

As mentioned by Dodge and Somberg (1987), one explanation for the overly aggressive responses among boys in the arousal condition may be that the aggressive cues provide the boys with a cognitive schema that is most salient after presentation and is therefore placed "at the top of the bin" according to Wyer and Srull (1981). According to the bin theory of social information processing, boys are more likely to retrieve from memory responses to situations that were either recently activated, or are frequently activated. By exposing boys to the white noise during processing stages, they may be less likely to expend cognitive resources to thinking through all the appropriate alternatives, but may instead rely on those that have just been activated. The exposure to the aggressive cues may enhance the retrieval of hostile responses from memory. This cognitive schema is more likely to be retrieved when the individual is trying to interpret actions in the near future.

Aggressive responses among boys in the arousal conditions were similar to those found in similar past research. This effect was found whether the conflict situations were hostile or ambiguous in nature. In line with Rabiner, Lenhart, and Lochman's (1990) findings, boys in the conditions in which their information

processing was biased in the encoding and interpretation stages of Dodge and Crick's (1996) information processing model, were more likely to respond aggressively, whereas boys in the control condition were likely to respond more moderately. These findings are similar to those found in Dodge (1980), Dodge and Somberg (1987), Dodge and Frame (1982), Dodge and Newman (1981), and Mize and Ladd (1987). These studies add support to those in the field of biased social information processing among children.

Despite the similarities with past research, the present study is a significant contribution to this literature in that it provides evidence on several aspects of aggression that have not previously been researched. These studies examined the social information processing of preschool-age boys. With the exception of Mize and Ladd (1987), this population has been neglected in the research literature. It is important to include young children in this line of research because aggressive responses are learned when children are very young and become harder to replace with more appropriate responses as the child gets older. These aggressive responses have been related to a low quality of peer interactions (Adams & Roopnarine, 1994), peer-rejection (Dodge, Coie, Pettit, & Price, 1990), and general feelings of unpopularity (Masters & Furman, 1981) which in turn lead to later life maladjustment (Parker & Asher, 1987).

This study also examined boys who had not been pre-screened for level of aggression. In almost all of the developmental research conducted on aggression, children have been pre-assigned to either aggressive or nonaggressive conditions depending on their behavior in everyday situations. These designs usually relied on parent, peer, and teacher reports of children's behavior to assign them to a condition. This study exhibited identical trends in the data without restricting the sample to aggressive children. The fact that this study used an unselected population of boys has significant implications for the planning of future research in this area. These studies provide a way to elicit hostile attributions among preschool-age children through

biasing their social information processing in the early stages by manipulating environmental conditions. The external method of eliciting aggression used in these two studies might trigger the internalized biased encoding and interpretation of cues that happens in aggressive older children.

One possible explanation for the failure to replicate prior studies illustrating an effect of arousal on gender-stereotyping with adults, specifically the Paulhus, Martin, and Murphy (1992) study, may be a lack of sufficient arousal. Another explanation may be that the heart rate measure used in this study was not effective in detecting changes in arousal level. Due to the failure of this manipulation check on arousal, it was not possible to determine whether the subjects in this study were truly aroused. The heart rate manipulation check used in this study was different from the subjective measure used by Paulhus, Martin, and Murphy (1992). The subjective nature of their procedure may not have been as reliable using four-year old children.

Another reason this study may have failed to find increased stereotyping in conditions of arousal was the method used for measuring responses. In the Paulhus, et al., (1992) study, subjects were required to memorize behavioral descriptions of target individuals and were asked to recall information about these individuals under conditions of high or low arousal. Subjects in the present study were asked to make choices about pictured children based on their preferences, or desire to play with these children. These choices were made while the subjects were being exposed to white noise. The subjects in the present study were not asked to memorize any information about the pictured children. The preferences of these subjects for the pictured children were based on their immediate reactions to these children. This procedure may not be sufficient in eliciting differences in gender-stereotyping among subjects exposed to white noise and those not so exposed.

Although this study did not support the hypotheses regarding arousal and gender-stereotyping among preschool-age boys, it does suggest that by age four, boys

already have developed an intolerance for playing with dolls. This finding is important in examining the attempts of the early childhood curricula to promote nonstereotypic play among children. By the time a child enters kindergarten, he or she has already developed a sense of what is stereotypically appropriate for his or her gender. Dramatic play among young children is highly stereotypic in nature and boys usually avoid playing with dolls, probably because it is seen as feminine.

One limitation of the present study was the inability to differentiate the cause of the differences in responding among boys in the two conditions due to the nature of the experimental design. It was not possible to determine whether the noise was responsible for the differences in aggressiveness of responses between the two conditions, or whether it was the aggressive cues presented. However, assuming that heart rate is a sensitive measure of arousal, it seems that increased physiological arousal because of the noise is insufficient to account for the increase in aggressive responses.

Another limitation of this study was the exclusive use of boys. It is suggested that future research should investigate girls and hostile attributional biases by creating situations that allow examination of relational aggression, as opposed to the physical and instrumental aggression that has so frequently been used in studies with boys. Although girls do not typically demonstrate the same types of aggression, it is important to note that aggression among girls does exist and is worth the attention of future researchers. Previous researchers have also ignored girls in this area of research, probably because they do not exhibit as much physical aggression as boys. It is important to investigate the differences between boys' and girls' social information processing strategies in order to determine whether boys exhibit more aggressive acts than girls because of their biased social information processing in challenging peer situations, because researchers have not used measures of aggression appropriate for girls, or for some other reason.

It has been determined that the exposure to noise, or other arousing environmental factors, during critical stages in social information processing tend to elicit more aggressive responses than would ordinarily be displayed among preschool-age boys. According to the findings of Rabiner, Lenhart, and Lochman (1990) in a similar study examining the level of aggressive responses elicited among young boys in conflict situations, aggressive responses are not only elicited more frequently among boys whose social information processing is biased, but aggressive responses are also elicited more rapidly than nonaggressive responses. These responses are elicited more impulsively than the less aggressive responses of their nonaroused counterparts. Aggression in children is a critical area to intervene with treatments to decrease aggressive responses because early aggression is predictive of later aggression and soon develops into a persistent and stable behavior pattern (Lochman & Lenhart, 1993). Kingston and Prior (1994) assert that these behavior patterns persist due to reinforcement from the environment via continued peer rejection, lowered self-esteem and later association with similarly deviant peers. Rabiner, Lenhart, and Lochman's (1990) results suggest that teachers and parents should slow the response time of children who tend to display a large number of aggressive responses in general. Based on the results of the current research, it may also be beneficial to reduce the amount of noise in the child's environment, as well as limiting children's exposure to aggressive cues such as those in television cartoons and commercials as a way of decreasing hostile responses. Children may respond more appropriately in social situations if environmental cues are neutral and their response time is slowed through the conscious exploration of other, perhaps more appropriate, behavioral responses.

Future research in this area should examine whether the 80 dB of white noise used to elicit arousal and consequently led to more aggressive responses in preschool-age boys is comparable to the aversive properties of ordinary classroom noise and the typical TV noise found in many households. These findings can be used to control

classroom noise and perhaps limit the number of aggressive responses among overstimulated students. Parents can also use these findings to turn down the background noise in their homes to promote normal information processing in their children.

In conclusion, this study has made some specific contributions to the children's social information processing literature. It has investigated the social information processing of preschool-age children, a subset of the literature that has been, for the most part, neglected. It is important to conduct research with young children because starting early will allow teachers, parents, and researchers to begin the process of early prevention. Interventions with these children, in order to be most effective, will include impulse control techniques and an increase in these boys' repertoire of possible behavioral responses.

These deficits in social information processing evident in the excessive number of instances in which aggressive children attribute hostility to their peers, result in aggressive verbal or behavioral responses to hypothetical situations. Anderson, Deuser, & DeNeve (1995) suggest that schematic knowledge structures include behavioral scripts, as well as thoughts, feelings, and memories and tend to be linked in memory in meaningful ways. By priming a subject with aggressive cues, similar aggression-related cognitions, behaviors and memories may consequently be activated. Arousal, in addition to the activation of hostility-related cues, facilitates the spreading activations of aggressive responses in memory through, what is referred to as excitation transfer processes (Anderson, et al., 1995).

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Appendix A

Informed Consent

Dear Parent,

We are asking permission to include your child in a research project to be conducted at your child's Day Care facility. The purpose of this research is to study the effects of noise (radio static) on preschoolers' judgments about other people in social situations. This project will include 120 four-year old children from the Des Moines area. Each child will participate in an enjoyable puppet game which will display conflict situations that preschoolers encounter in everyday play situations. Your child's participation will take about 10 minutes. Any child who does not wish to participate for any reason will not be pressured to do so. Your child's responses will be kept strictly confidential. This research will take place in a room at your child's Day Care Center. Children will also be observed in groups on the playground. This project will be helpful in looking at how children solve social problems.

We hope you will consent to your child's participation. Please return this form if your child may be included in this important research. We greatly appreciate your assistance in the completion of this project. If you have any questions about the research, please feel free to contact Krista Modracek at Drake University (271-3136) or Jane Rankin Ph.D. (271-3774).

Sincerely,

Krista Modracek
Research Assistant
Department of Psychology
Drake University

_____ _____

Child's Name (Printed) Parent's Name (Printed)

_____ _____

Child's Date of Birth Parent's Signature

_____

Date Signed

Appendix B

Informed Consent

We are asking permission to include the children attending your Child Care facility in a research project. The purpose of this research is to study the effects of noise (radio static) on preschoolers' judgments about other people in social situations. This project will include 120 preschool children from the Des Moines area. Each child will participate in an enjoyable puppet game which will display conflict situations that preschoolers encounter in everyday play situations. Participation in this project will take about 20 minutes. Any child who does not wish to participate for any reason will not be pressured to do so. Each of the children's responses will be kept strictly confidential. In order to conduct this research project, a quiet room in your Child Care center will be needed. This project will be helpful in looking at how children solve social problems.

We hope you will consent to participate in this study. By signing this form, you voluntarily agree to participate in this project. We greatly appreciate your assistance in the completion of this project. If you have any questions about the research, please feel free to contact Krista Modracek at Drake University (271-3136) or Jane Rankin, Ph.D. (271-3774). You may keep one copy of this form.

_____

Director's Name (please print)

_____ _____

Signature Investigator's Signature

_____

Date